QuickTime for Video-Intensive Applications

Session 602

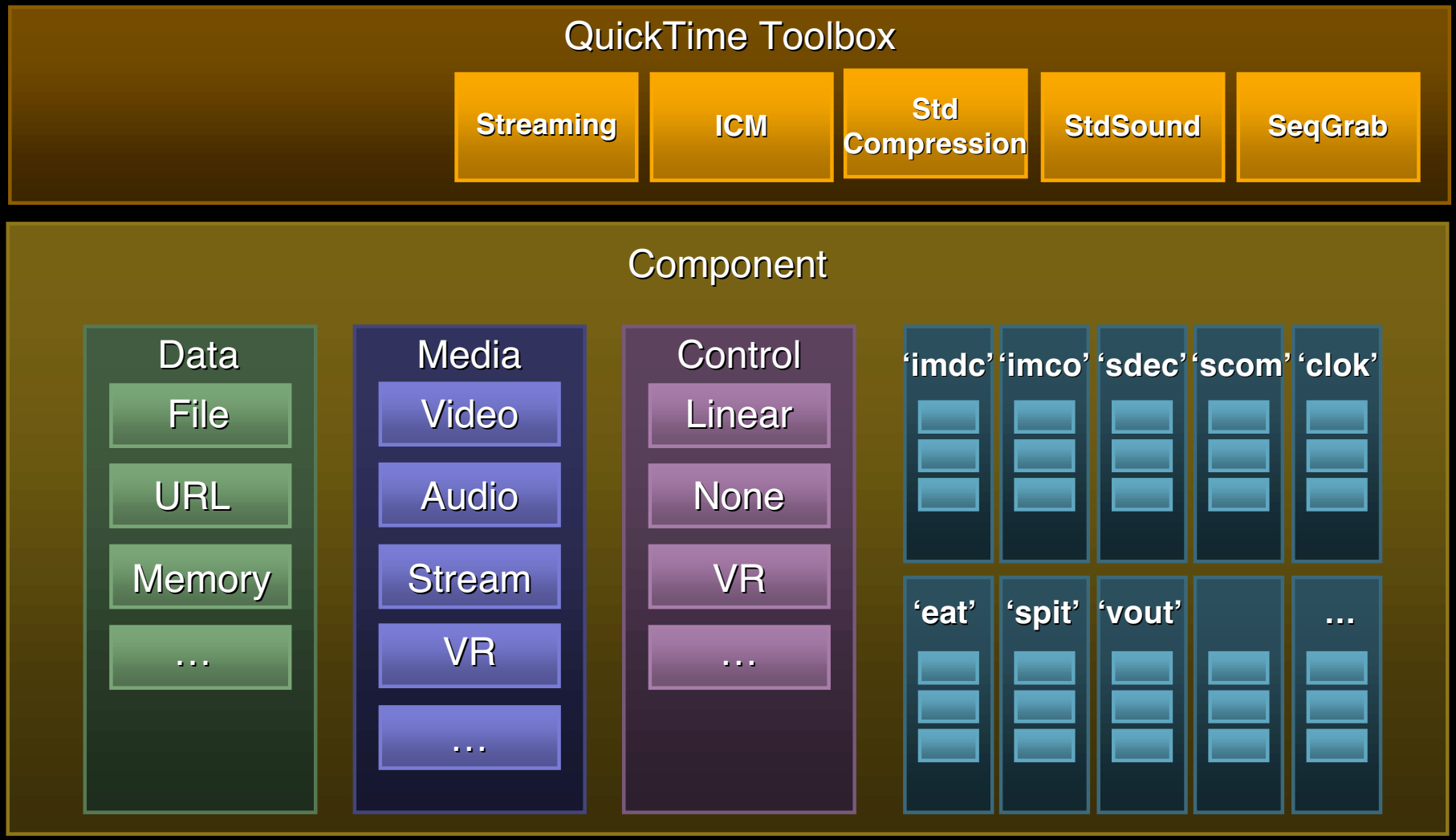
QuickTime for Video-Intensive Applications

Tim Cherna
Engineering Manager
QuickTime Pro Media Group

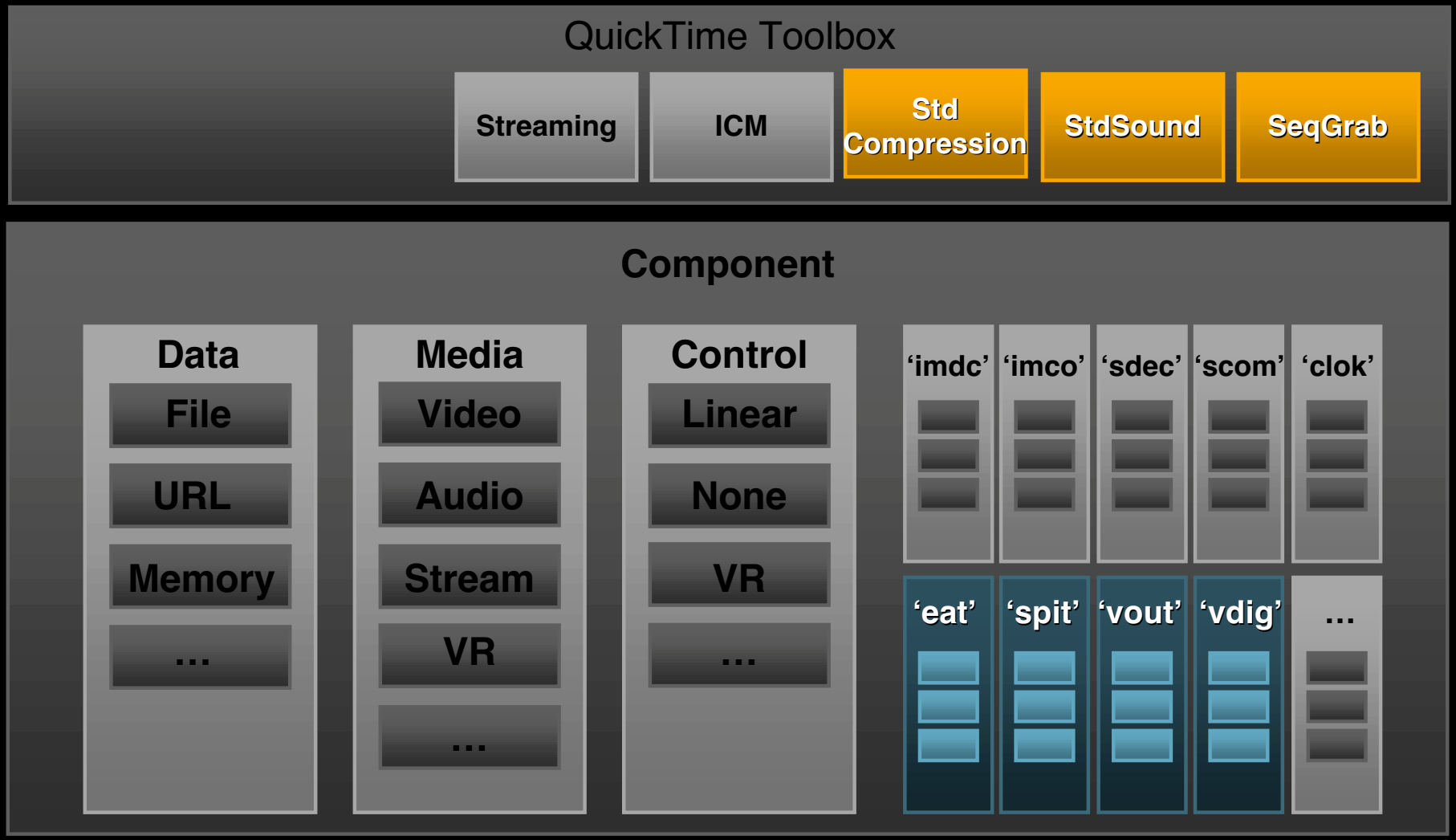
Introduction

- Acquisition
- Video processing
- Video output

QuickTime Overview



QuickTime Overview



Acquisition

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Acquisition

- QuickTime provides capture of video and audio (and other)
- Sequence Grabber does the work

Sequence Grabber Overview

- Sequence Grabber holds channels
- Channels capture media
- Any number of channels possible
- Source: HackTV
  - NB: All URLs summarized at the end . . .

Basic Capture Sequence

SGSettingsDialog

SGPrepare

SGStartRecord

SGIdle

SGStop

New SG APIs (QuickTime 6.0)

- DeviceList structure—now lists inputs if desired
  - New flag **sgDeviceListIncludeInputs**
- Utility functions avoid direct device calls

  SGGetChannelDeviceAndInputNames

  SGSetChannelDeviceInput

Changes to Panels/Settings

SGPanelGetDITLForSize
SGGetChannelRefCon

- QuickTime stores more info to properly identify the **vdig**

Changes to SG/VDIG Interaction

SGGrabCompressComplete
VDCompressDone(…, &frames,…)

- Reports queuing of frames

SGSetChannelSettingsStateChanging
VDCaptureStateChanging

- New flags for **SGSetChannelUsage**
  - **seqGrabLowLatencyCapture**
  - **seqGrabAlwaysUseTimeBase**

Changes to SG/VDIG Interaction

VDGetDeviceNameAndFlags

- Multiple devices from one VDIG

VDGetUniqueIDs
VDSelectUniqueIDs

- For identifying hot-pluggable devices

Capturing Sound

- Old way: **SndRecordToFile**
  - Not preferred, not on Mac OS X
- Use SG with a sound channel
  - Now provides better sample rate, bit depth and channel control
- Available in QuickTime 5.0.4 on Mac OS X

Other Enhancements for Capture

- IIDC (Firewire YUV and RGB) camera support (in Jaguar)
- New Settings UI
    - Scrollable device list
    - Aqua and tabs
    - Enhanced preview
    - Image panel

Demo

Capture and IIDC

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Video Processing

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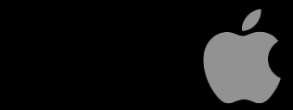
Video Processing

- Process live capture
- Process existing movie
- Process movie playback



Processing Live Capture

Camera

QuickTime

Compressed Data

App's SGData Proc

Screen

Decompressed

Process and Save

Processing Live Capture

- Pros
  - Takes place live
- Cons
  - Can cause dropped frames
- Uses
  - Non pro-video capture
  - Detection operations
- Source: **SGDataProcSample** (Minimung)

Demo

Processing Live Capture

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Senior Software Engineer
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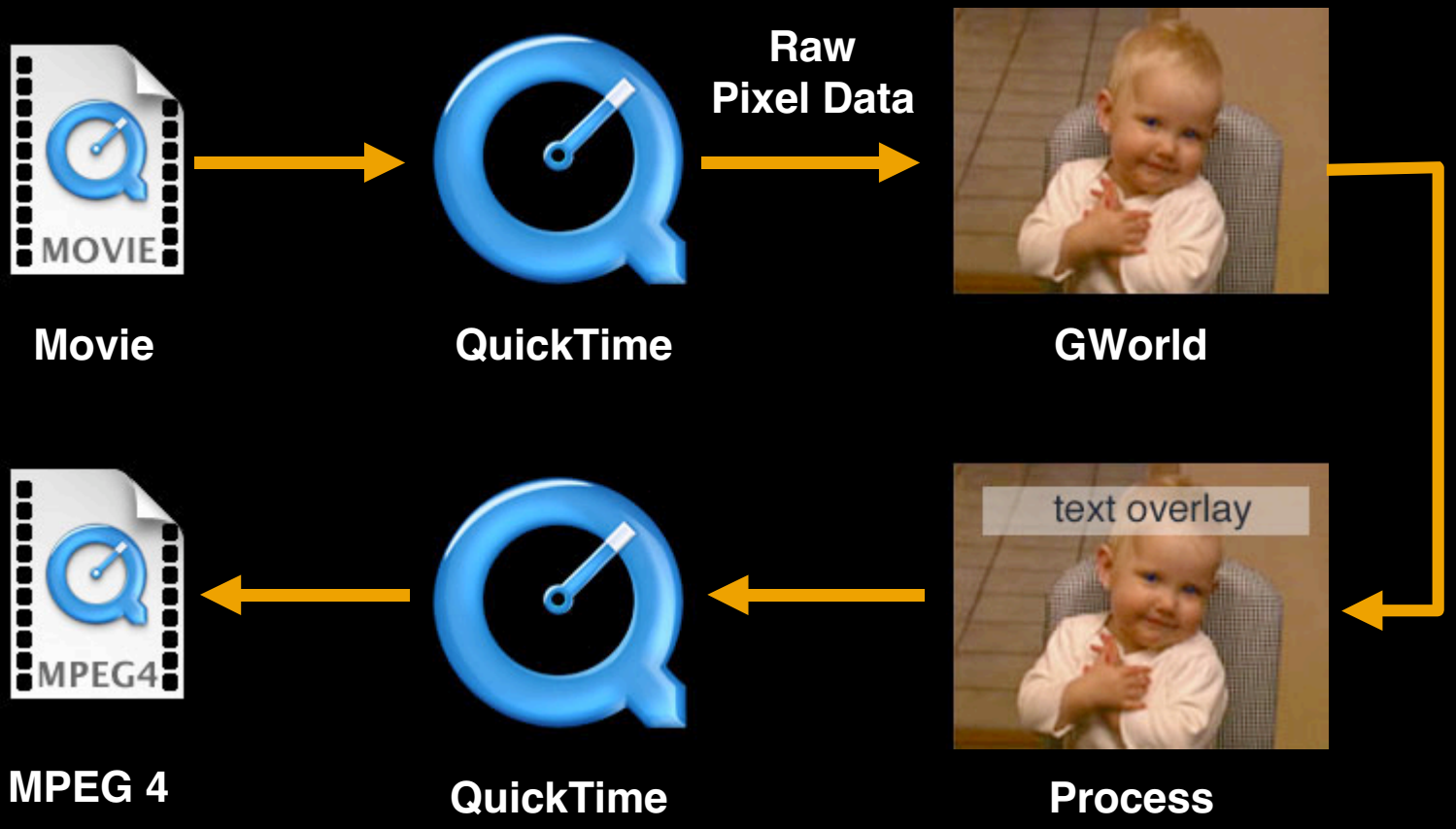
Processing Existing Movie



Processing Existing Movie

- Pros
  - All frames modified
  - No time constraints
- Cons
  - Not real time
  - Single “setting”
- Uses
  - 3:2 pulldown
  - Blur/sharpen, etc.
- Source: **ConvertToMovieJr**

Demo

Processing Existing Movie

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Sidebar: Video Compression

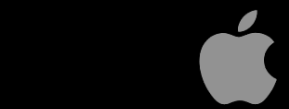
- Standard Compression Dialog
- Can configure via code
- Preferred way to produce recompressed data
- Source: **ConvertToMovieJr**

Sidebar: Image Import/Export

- A quick way to add lots of features
- Import:
  - JPEG, GIF, PNG, TIFF, DV-Diff, etc . . .
- Export
  - JPEG, PNG, TIFF, DV-Diff, etc.
- You can write these too!

Processing Movie Playback

- QuickTime effects
  - Operates on tracks
  - Source: **MakeEffectMovie**
- In the Application
  - Operates on Movies
  - Example: Video Adjustments



Processing Movie Playback

QuickTime

QuickTime

Raw
Pixel Data

DrawCompleteProc

Screen

Decompressed

Process and Save

Processing Movie Playback

- Pros
  - Movie playback is live
  - User can interact
  - Works on entire movie at once
- Cons
  - Not all frames
  - Can be difficult to package code
- Uses
  - Live movie adjustments
- Source: **MovieGWorlds**

Demo

Processing Movie Playback

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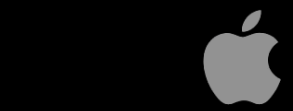
What Is Processing?

- QuickTime Effects
- Custom code
- Performance
    - Optimization
    - Velocity Engine
    - Multiprocessor
    - OpenGL



How to Draw?

- 2D graphics calls
  - **CopyBits()**
  - **NSImage()**
  - Decompression sequence
- Built-in decompression component
- OpenGL texture

Demo

More Processing

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Video Output

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Senior Software Engineer
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Video Output

- QuickTime movies are displayed on computer desktop
- Video Output Components allow applications to target ‘non-desktop’ devices
  - Third-party I/O cards
  - FireWire devices
  - Other peripherals
- Source: **SimpleVideoOut** (Application)

Video Output

- Video Outputs provide a custom GWorld
  - Movies must point to a GWorld
  - Only QuickTime can use it, not QuickDraw
- Also provides info on capabilities:
  - Preferred audio output
  - Clock components
  - Echo port (simultaneous display on desktop)

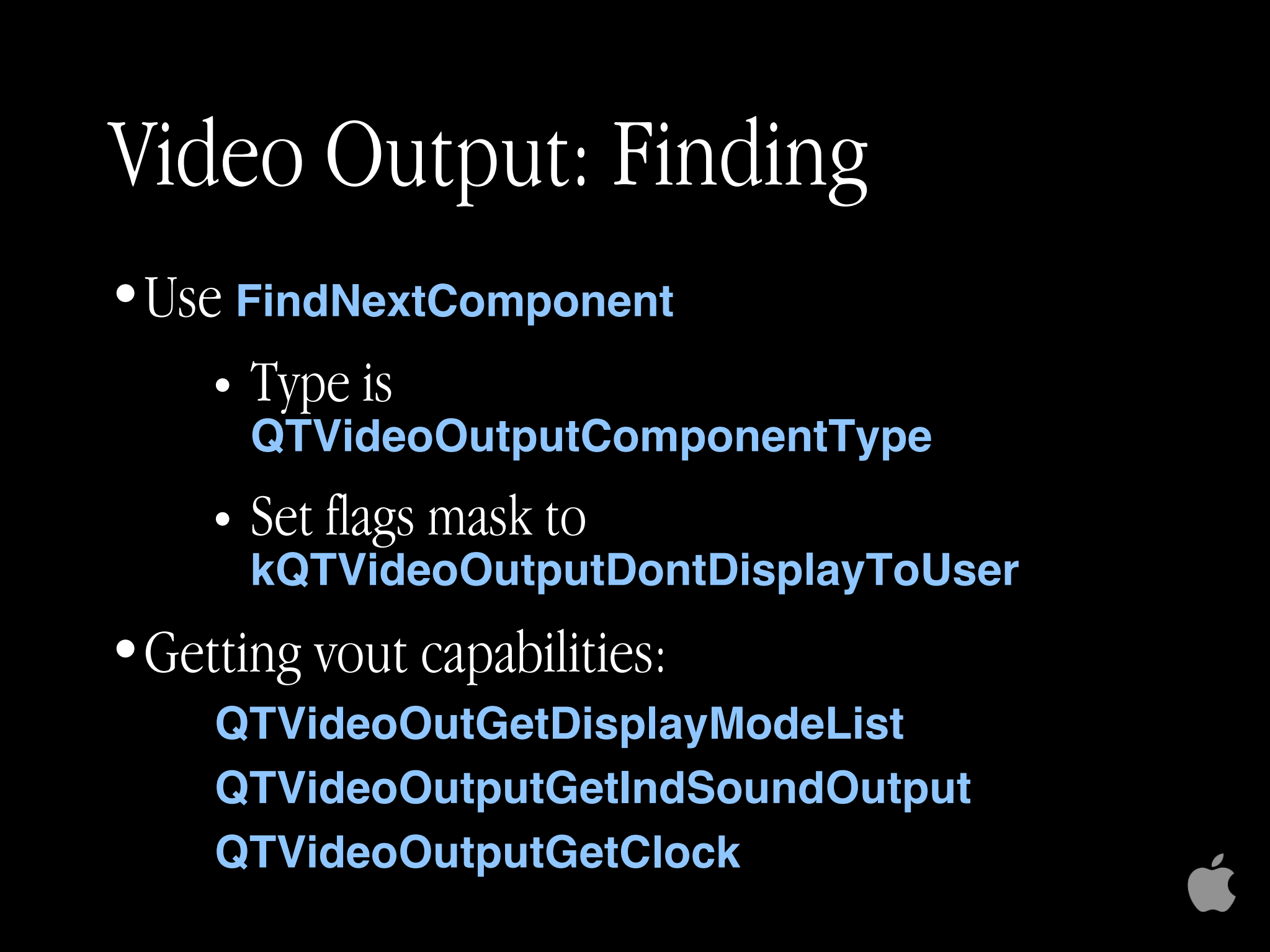
Video Output: Finding

- Use **FindNextComponent**
  - Type is **QTVideoOutputComponentType**
  - Set flags mask to **kQTVideoOutputDontDisplayToUser**
- Getting vout capabilities:

  QTVideoOutGetDisplayModeList

  QTVideoOutputGetIndSoundOutput

  QTVideoOutputGetClock



Video Output: Selecting

- Setting up the vout component:
  - **QTVideoOutputSetDisplayMode**
  - **QTVideoOutputBegin**
  - **QTVideoOutputGetGWorld**
  - **QTVideoOutputSetEchoPort(…**
    (CGrafPtr)nil)
- Pointing the movie to it:
  - **SetMovieVideoOutput(…,voutInst)**
  - **SetMovieGWorld(..., voutGWorld, …)**

Video Output: Echo Port

- Available if vout component implements **kQTVideoOutputSetEchoPortSelect**
- Setting up the vout component:

```
QTVideoOutputSetEchoPort(.., 
  (CGrafPtr)desktopGWorld );
```

- Pointing the movie to it:

```
SetMovieGWorld(..., desktopGWorld, …);
```

Video Output: Restoring

- Pointing the movie back to desktop:

  SetMovieGWorld(…, desktopGWorld, …)

  ChooseMovieClock

  SetMovieVideoOutput(…, nil)

- Stopping the vout component:

  QTVideoOutputEnd

Video Output: Sound

- Available if vout component implements
  kQTVideoOutputGetIndSoundOutputSelect
- Get using:

  QTVideoOutputGetIndSoundOutput(…
  &soundOutComponent)
- On all SoundMediaType tracks:

  MediaSetSoundOutputComponent(…,
  soundOutComponent)

Video Output: Clock

- Available if vout component implements **kQTVideoOutputGetClockSelect**
- Get using:

  QTVideoOutputGetClock(… &clockComponent)
- Set using:

  SetMovieMasterClock(… (Component) clockComponent, …)

Demo

Video Output

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Senior Software Engineer
QuickTime Pro Media Group

QuickTime Roadmap

600 The State of QuickTime in 2002	Room A2 **Wed., 9:00am**
601 Building QuickTime-Savvy Apps	Room A2 **Wed., 10:30am**
602 QuickTime for Video-Intensive Applications	Room A2 **Wed., 2:00pm**
603 Media Integration With QuickTime	Room A2 **Wed., 3:30pm**
604 Delivering Content via Interactive QuickTime	Room A2 **Wed., 5:00pm**

QuickTime Roadmap (Cont.)

FF010 QuickTime	Room J1 **Fri., 10:30am**
606 QuickTime for the Web	Room A2 **Fri., 2:00pm**
607 QuickTime and MPEG-4: A Technical Overview	Room A2 **Fri., 3:30pm**

Who to Contact

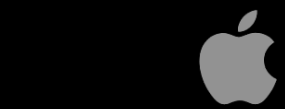
Developer Technical Support
dts@apple.com

Jeff Lowe
QuickTime Technology Evangelist
jefflowe@apple.com

http://developer.apple.com/wwdc2002/urls.html

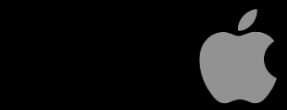
For More Information

- QuickTime online documentation
  developer.apple.com/quicktime
- QuickTime sample code
  developer.apple.com/samplecode/Sample_Code/QuickTime
  - MovieGWorlds
    /Basics/MovieGWorlds.htm
  - HackTV
    /Capturing/HackTV_Carbon.htm
  - ConvertToMovieJr
    /Importers and Exporters/ConvertToMovieJr.htm



For More Information

- QuickTime online documentation
  developer.apple.com/quicktime
- QuickTime sample code
  developer.apple.com/samplecode/Sample_Code/QuickTime
  - SimpleVideoOutput
    /Capturing/SimpleVideoOutput.htm
  - SGDataProcSample
    /Capturing/SGDataProcSample.htm



Reminder

The QuickTime Engineering Team
Is Holding a “Hands-On Lab” Everyday
From 1:00–4:00pm in Room G . . Stop By!


WWDC2002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